

## DRERIP

The Delta Regional Ecosystem Restoration Implementation Plan (DRERIP) addresses the evaluation and prioritization of restoration actions rather than stressors. However, the process has relevance to the ways that one might think about an evaluation of stressors as well.

“Scientific assessment” is the foundation of the DRERIP process. In DRERIP, potential ecosystem restoration actions are evaluated through a 3 step process:

- Step 1: Preliminary Sorting** - separates out actions that have been completed in whole or in part and identifies remaining actions as either research or implementation actions;
- Step 2: Initial Evaluation** - looks at the overall clarity of the action (as written), including whether there is a clear cause and effect relationship (either explicit or implicit) and whether the action is clearly written (ERP actions in need of clarification will be rewritten using a prescribed rewriting process presented below); and
- Step 3: Adaptive Management (AM) Routing** - provides a procedure for categorizing the actions into specific implementation categories.

The DRERIP team has developed a suite of species life history and ecosystem conceptual models. These conceptual models describe our current understanding of species life histories and how various components of the ecological systems work including hypotheses about cause and effect relationships, or linkages, between drivers (ecosystem elements that affect other components of the system) and outcomes (a result, effect, or consequence). The conceptual models are to be used in Step 2 (Initial Evaluation) and Step 3 (Adaptive Management Routing) of the DRERIP evaluation process. In step 2, conceptual models will be used to determine if there is a known or hypothesized cause and effect relationship that suggests that the restoration action has the potential for beneficial effects. In the Adaptive Management Routing, the conceptual models identify expected consequences of an action (both good and bad) and the anticipated magnitude and likelihood of those outcomes. Essentially, the conceptual models represent the information base for evaluating if an action will have its intended effect, and what the potential unintended effects might be (i.e. is it worthy, and what are the risks?). [Note that in its use of conceptual models to structure thinking about cause and effect relationships DRERIP mirrors the EPA Stressor Identification and Ecological Risk Assessment processes].

The flow chart below shows the DRERIP evaluation process and where the conceptual models (labeled CM) come into play. The highlighted box near the bottom of the flow chart identifies four critical outcomes of the analysis: 1. is the action likely to have a large beneficial effect (rank score 1-4); 2. is the action likely to have large negative effects (rank 1-4); 3. are the effects of the action reversible; and 4. are there opportunities for learning inherent in the action?

Step 1 of the DRERIP process is largely an administrative process not very relevant to stressor evaluation.

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Flow diagram of the DRERIP assessment process

Step 2, the Initial Evaluation, involves clarification of the potential actions and developing a common understanding of both the action and its expected consequences. This is a critical step in any evaluation process and is analogous to the problem identification phase of ecological risk assessment. Clarifying actions involves a dialogue between potential actions and conceptual models to help focus and structure the potential action so that it is consistent with the best scientific understanding of both species and ecosystem. This process imposes important constraints on both restoration actions and the conceptual models. The actions need to be consistent with our understanding of the species and their ecosystems and the conceptual models need to be structured to receive input in the form of restoration actions and deliver output in the form of desired outcomes or endpoints.

This process of assessing how well defined an action is and whether or not it is likely to be useful can be applied to both restoration actions and research actions. In both cases the conceptual models provide a basis for making preliminary decisions about which actions to pursue.

In Step 3, Adaptive Management Routing, actions that survive the Preliminary Sorting and Initial Evaluation steps are assigned into one of five implementation categories:

1. **Targeted Research** – Pursue targeted research.
2. **Pilot** - Pursue a pilot or demonstration project to test the action.
3. **Full-Scale** - Pursue full-scale implementation of the action.
4. **Rewrite and Re-route Action** – Re-write action to reflect an alternative approach.
5. **Discard** – Remove from consideration based on analysis of outcomes.

Assignment is based on expert judgment in combination with the conceptual models. Actions are assessed in terms of their potential positive and negative outcomes if implemented, the magnitude of these outcomes, and the level of certainty that can be assigned to various outcomes. Actions are assigned scores in relation to these attributes and the scores combined to generate estimates of the “worthiness” of an action (from its positive outcomes) or the “risk” of implementation (from its negative outcomes). Very specific instructions are included in the DRERIP documentation for scoring actions and developing the estimates of worthiness and risk. Actions are also scored in terms of the reversibility of their outcomes and the potential for learning about the system from implementing the action. These assessments are then put through a decision tree (see diagram below) to make the assignment to the categories above.

Although not designed for the analysis of stressors, an analogous approach could be developed for using best available information to classify and prioritize stressors.

Documentation of the DRERIP process can be found at:

<http://www.dfg.ca.gov/delta/erpdeltaplan/> and,  
[http://www.dfg.ca.gov/delta/erpdeltaplan/science\\_process.asp](http://www.dfg.ca.gov/delta/erpdeltaplan/science_process.asp)



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